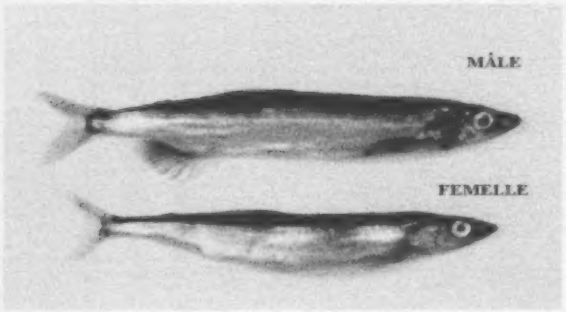
Fisheries and Oceans Canada | Pêches et Océans Canada
Ecosystems and Oceans Science | Sciences des écosystèmes et des océans

Canadian Science Advisory Secretariat
Science Response 2015/032

Quebec Region

UPDATE OF INDICATORS OF THE STATUS OF THE ESTUARY AND GULF OF ST. LAWRENCE (DIVISIONS 4RST) CAPELIN STOCK IN 2014



(source: DFO)

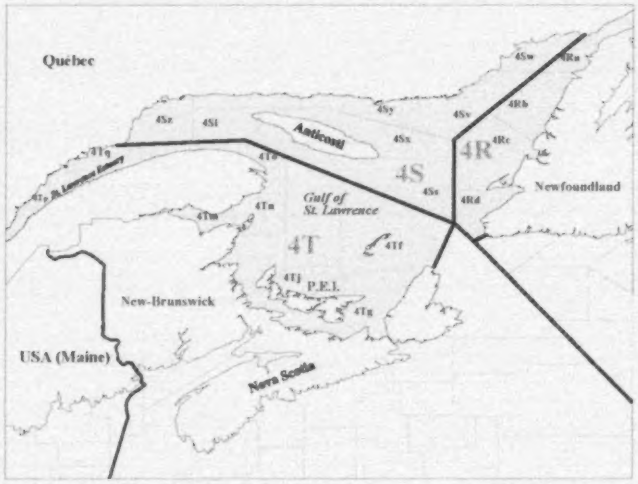


Figure 1. Map of NAFO Divisions 4RST (coloured area).

Context

Capelin in the Gulf of St. Lawrence is managed as a single stock with two distinct management units, NAFO Divisions 4R and 4ST (Figure 1). A Total Allowable Catch (TAC) of 14,300 t was in effect for the entire stock in 2013 and 2014, an increase of 10% compared with the 2012 TAC. This TAC is divided as follows: 12,315 t for Division 4R and 1,985 t for all of Divisions 4ST. There is no abundance survey specifically directed on capelin. It is therefore impossible to calculate spawning biomass, fishing mortality and reference points, which would help define, based on the precautionary approach, a decisional framework for the fishery and a TAC.

The assessment of capelin (*Mallotus villosus*) in the Estuary and Gulf of St. Lawrence (NAFO Divisions 4RST) is conducted every two years, and the results are used in the development of an Integrated Fishery Management Plan (IFMP). The last assessment of this stock was conducted in February 2013. A regular assessment was planned for 2015, but had to be postponed. In order to provide information for managing these stocks, it has been suggested that an update of the main indicators of this resource be done to determine if major changes in stock status have occurred.

This Science Response is the result of the May 15, 2015 Science Response Process on the Update of the Divisions 4RST capelin stock status.

Canada

Analysis and Response

Commercial fishery

Reported catches of capelin in Divisions 4RST have decreased from 9,539 t in 2012 to 6,553 t in 2013. This decrease continued in 2014, to 5,576 t, a decrease of 42% compared to 2012 (Figure 2). For the 2012-2014 period, more than 93% of landings came from the west coast of Newfoundland (Division 4R) (Figure 1). During the 2008-2012 period, landings in 4R represented between 70-91% of the TAC allocated to this division. In 2013 and 2014, landings represented less than 52% of the TAC.

In Division 4S, catches of 236 t and 20 t were reported in 2013 and 2014, respectively. No catches were declared in Division 4T for the same period.

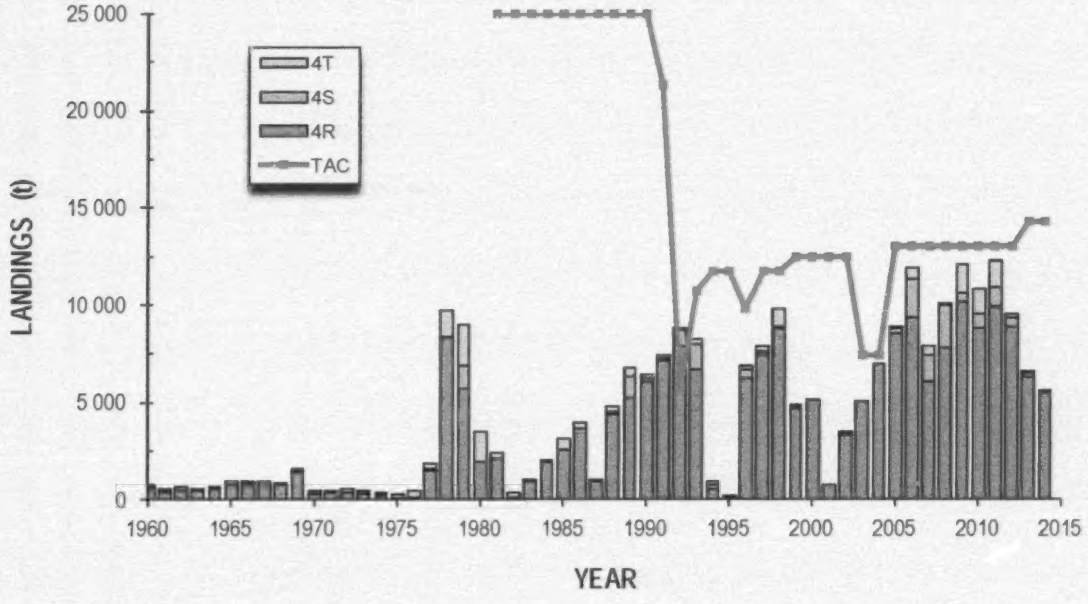


Figure 2. Capelin TAC and reported landings (t) in NAFO Divisions 4RST between 1960 and 2014.

In 2014, the majority of capelin catches were landed using the purse seine, with 66% (3,659 t) of landings. The other gear types used were the tuck seine with 28% (1,547 t) and the trap with 7% (370 t) of landings.

Fishing occurs mainly in June in unit areas 4Rb, 4Rc and 4Rd and in July in unit area 4Ra (Table 1). Historically, landings were larger in June in Division 4R. However, since 2013, catches were more abundant in July due to the higher percentage of landings in 4Ra. Thus, July landings represented respectively 67% and 91% of the total landings in 2013 and 2014, compared to 15% in 2012.

Table 1. Monthly capelin landings (t) in the unit areas of NAFO Division 4R in 2012, 2013 and 2014.

YEAR	UNIT AREA	MONTH									TOTAL
		2	3	4	5	6	7	8	9	10	
2012	4Ra					189	1,229				**1,418**
	4Rb					1,692	67				**1,759**
	4Rc					5,590					**5,590**
	4Rd					147					**147**
	Total	**0**	**0**	**0**	**0**	**7,618**	**1,296**	**0**	**0**	**0**	**8,914**
2013*	4Ra					1,345	4,212				**5,557**
	4Rb					311					**311**
	4Rc					16					**16**
	4Rd					378					**378**
	Total	**0**	**0**	**0**	**0**	**2,050**	**4,212**	**0**	**0**	**0**	**6,262**
2014*	4Ra						4,988	41			**5,029**
	4Rb					280					**280**
	4Rc					146	52				**197**
	4Rd					50					**50**
	Total	**0**	**0**	**0**	**0**	**476**	**5,039**	**41**	**0**	**0**	**5,556**

**Preliminary data*

Stock Status Indicators

The **mean lengths** of female and male capelin caught in Division 4R showed significant variations over the 1984-2014 series. The mean length of the series (1984-2013) is 165.0 mm for males and 147.5 mm for females. Male and female sizes were above their respective mean for the period 1984-1992, dropped below the mean in 1992 and 1993, and remained there until 2002. The minimum was reached in 1999 with 151.7 mm and 134.5 mm for males and females, respectively. There was a clear increase in mean lengths between 1999 and 2005. Subsequently, values fluctuated around their mean value until 2013. The values are generally within the interval of ± ½ standard deviation about the mean (Figure 3). Values for females (169.7 mm) and males (179.5 mm) in 2014 were the highest since the beginning of the series, significantly higher than in 2013, and well beyond their respective mean.

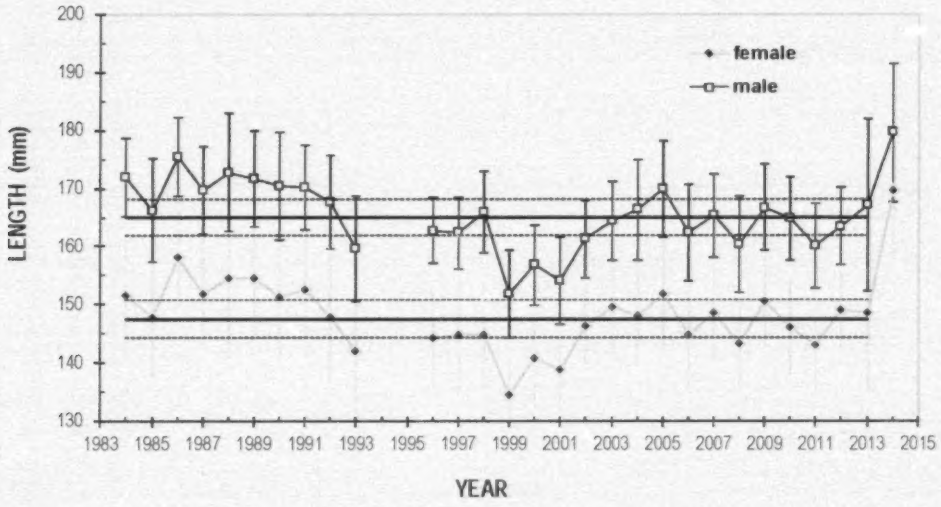


Figure 3. Mean length (mm) of female and male capelin caught using purse and tuck seines in NAFO Division 4R since 1984. The horizontal lines represent the means from the 1984-2013 period (solid lines) ± 0.5 x standard deviation (dotted lines). The vertical lines represent standard deviations.

The **dispersion indices** (not abundance indices) that are obtained from catches from multidisciplinary groundfish and shrimp surveys in the Estuary and in the northern and southern Gulf of St. Lawrence show a clear upward trend from 1990 to 2003 (Figure 4). Relatively steady values about the mean are then observed until 2009. Between 2010 and 2013, the dispersion index rises above the upper limit to some of the highest values in the series. In 2014, the dispersion index decreases to the mean of the series.

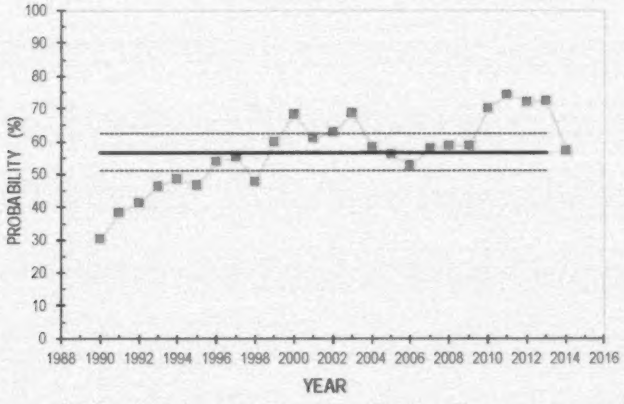


Figure 4. Dispersion index (%) based on the mean probabilities of finding capelin in NAFO Divisions 4RST sampled in the multidisciplinary surveys in the Estuary and in the northern and southern Gulf of St. Lawrence. The horizontal lines represent the mean for the 1990–2013 period (solid line) ± 0.5 x standard deviation (dotted lines).

Fishery performance index

The **performance** index for the combined purse seine and tuck seine fisheries expressed in catches (t) per fishing day and per vessel (t/day/vessel) in Division 4R shows an upward trend from 2005 to 2011. However, the performance index decreased in 2012, then increased in 2013, reaching the highest value of the series. In 2014, the index then decreased to the 2010 value and is still above the upper limit of the 2012 series mean for 1984-2012 (Figure 5).

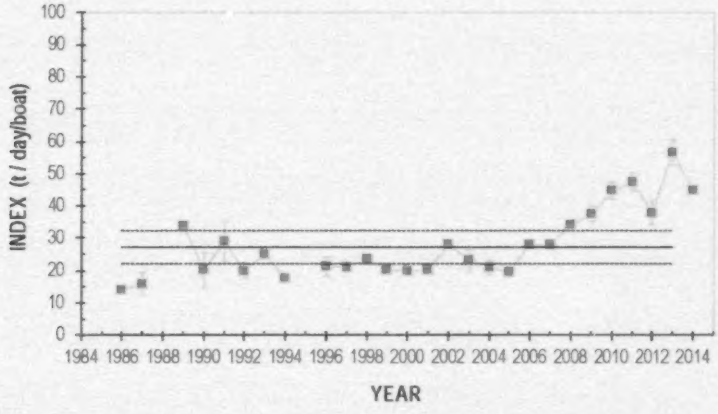


Figure 5. Performance index (t/day/vessel) for the combined purse seine and tuck seine fisheries in Division 4R. The horizontal lines represent the mean for the 1984-2013 period (solid line) ± 0.5 x standard deviation (dotted lines). The vertical bars represent standard deviations.

Conclusions

The decrease in landings observed in 2012 in Divisions 4S and 4T continued in 2013 and 2014. In Division 4R, a decrease in catches observed in 2012 takes shape in 2013 and 2014.

In 2014, the mean lengths of female and male capelin reached the highest values in the series thereby confirming an upward trend that began in 2012. The capelin dispersion index, which had been at historical highs from 2010 to 2013, decreased in 2014, reaching the mean value of the series.

The fishery performance index in Division 4R that had reached the highest value of the series in 2013, decreased in 2014. However, the value of this index is high and well above the series mean.

As the capelin's lifespan is short, its abundance can be subject to sudden changes because the population is made up of only a few age groups. Because of the markets, the fishing effort is strongly correlated with the size of female capelin and is concentrated in regions where environmental conditions are more favourable to growth. Although only a very small proportion of the total biomass is harvested in the commercial fishery, it is important to note the capelin's prominent role as a forage species in the marine ecosystem and to mention that the fishing effort should be dispersed along the coast, not focused locally.

The current TAC (14,300 t) in Divisions 4RST is not based on quantitative analyses. Given the size and fishing pattern changes observed in this stock, close monitoring of this stock is advisable. However, the indicators available suggest that it is not necessary to change the science advise based on this update.

Contributors

Name	Affiliation
Bourdages, Hugo	DFO, Science, Quebec Region
Castonguay, Martin (Co-responsible)	DFO, Science, Quebec Region
Cyr, Charley	DFO, Science, Quebec Region
Gauthier, Johanne	DFO, Science, Quebec Region
Légaré, Benoît (Co-responsible)	DFO, Science, Quebec Region
Plourde, Stéphane	DFO, Science, Quebec Region

Approved by

Yves de Lafontaine
Regional Director, Science
Quebec Region
Fisheries and Oceans Canada

Date: July 6, 2015

Sources of information

DFO. 2013. Assessment of the Estuary and Gulf of St. Lawrence (Divisions 4RST) Capelin Stock in 2012. DFO Can. Sci. Advis. Sci. Advis. Rep. 2013/021.

Grégoire, F., Girard, L., Beaulieu, J.-L., Lussier, J.-F. and Bruneau, B. 2013. Capelin (*Mallotus villosus*) in the Estuary and Gulf of St. Lawrence (NAFO Divisions 4RST) in 2012. DFO Can. Sci. Advis. Sec. Res. Doc. 2013/023. vi + 91p.

This Report is Available from the

Center for Science Advice (CSA)
Quebec Region
Fisheries and Oceans Canada
Maurice Lamontagne Institute
P.O. Box 1000
Mont-Joli, Qc G5H 3Z4

Telephone: 418-775-0825
E-Mail: bras@dfo-mpo.gc.ca
Internet address: www.dfo-mpo.gc.ca/csas-sccs/

ISSN 1919-3769
© Her Majesty the Queen in Right of Canada, 2015

Correct citation for this publication:

DFO. 2015. Update of Indicators of the Status of the Estuary and Gulf of St. Lawrence (Divisions 4RST) Capelin Stock in 2014. DFO Can. Sci. Advis. Sec., Sci. Resp. 2015/032.

Aussi disponible en français :

MPO. 2015. Mise à jour des indicateurs de l'état du stock de capelan de l'estuaire et du golfe du Saint-Laurent (divisions 4RST) en 2014. Secr. can. de consult. sci. du MPO, Avis sci. 2015/032.